

**To all students entering 11th Math SL & HL Analysis classes.**

In order to keep our current math skills sharp, please complete this summer review packet. Use your previous class notes and work, websites such as Khan Academy and IXL and other math reference books for guides. Please complete before the first day of school in August 2021. You will be tested on this material when you return to school.

Show all work, graphs and solutions clearly on a **separate** sheet of paper.  
Your work should be numbered and organized so it is easy to read.  
Solutions are not provided with this packet.

Have a good summer!

CDS Mathematics Department

Name: \_\_\_\_\_

**11<sup>th</sup> Math SL Analysis & HL Analysis**  
**Summer Review Packet 2021**  
**DUE on the FIRST day of SCHOOL**

Topic	Extra Help on Khan Academy
Factoring	<a href="https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1">https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1</a>
Index Laws	<a href="https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression">https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression</a>
Radical Operations	<a href="https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals">https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals</a>
Complex numbers	<a href="https://www.khanacademy.org/math/precalculus/imaginary-and-complex-numbers/multiplying-complex-numbers/a/multiplying-complex-numbers">https://www.khanacademy.org/math/precalculus/imaginary-and-complex-numbers/multiplying-complex-numbers/a/multiplying-complex-numbers</a>
Solving Quadratics	<a href="https://www.khanacademy.org/math/algebra/quadratics">https://www.khanacademy.org/math/algebra/quadratics</a>
Solving Rational Equations	<a href="https://www.khanacademy.org/math/algebra2/rational-expressions-equations-and-functions/solving-rational-equations/v/equations-with-two-rational-expressions">https://www.khanacademy.org/math/algebra2/rational-expressions-equations-and-functions/solving-rational-equations/v/equations-with-two-rational-expressions</a>
Systems of Equations	<a href="https://www.khanacademy.org/math/algebra/systems-of-linear-equations">https://www.khanacademy.org/math/algebra/systems-of-linear-equations</a>
Graph Transformations	<a href="https://www.khanacademy.org/math/algebra2/manipulating-functions/stretching-functions/v/shifting-and-reflecting-functions">https://www.khanacademy.org/math/algebra2/manipulating-functions/stretching-functions/v/shifting-and-reflecting-functions</a>
Exponential Functions	<a href="https://www.khanacademy.org/math/algebra2/exponential-and-logarithmic-functions/graphs-of-exponential-functions/v/transforming-exponential-graphs">https://www.khanacademy.org/math/algebra2/exponential-and-logarithmic-functions/graphs-of-exponential-functions/v/transforming-exponential-graphs</a>
Right Triangle Trig	<a href="https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles">https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles</a>
Statistics BoxPlot	<a href="https://www.khanacademy.org/math/ap-statistics/summarizing-quantitative-data-ap/stats-box-whisker-plots/v/interpreting-box-plots">https://www.khanacademy.org/math/ap-statistics/summarizing-quantitative-data-ap/stats-box-whisker-plots/v/interpreting-box-plots</a>
Statistics Standard Deviation	<a href="https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/a/calculating-standard-deviation-step-by-step">https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/a/calculating-standard-deviation-step-by-step</a>

### **I. BASICS:**

1. Simplify the expression:  $(2 - 20i) + (14 - 7i)$ .
2. Simplify the expression:  $(7 + 9i)(8 - 10i)$ .
3. Simplify the expression:  $\frac{3}{6 + 7i}$ .
4. Simplify  $\sqrt{25x^{20}y^{14}}$ .
5. In an alternating-current circuit, the voltage  $E$  is given by  $E = IZ$ , where  $I$  is the current (in A) and  $Z$  is the impedance (in  $\Omega$ ). Each of these can be represented by complex numbers. Find the complex number representation for  $I$  if  $E = 62 + 32i$  volts and  $Z = 1200 - 560i$  ohms.
6. Simplify the expression  $\sqrt[5]{\frac{243}{32}}$ .
7. Find  $f(t + 7)$  for  $f(x) = 2x^2 - 9x + 8$ .
8. Divide using long division:  $(6x^6 - 3x^5 + 15x^4 - 21x^3 + 15x^2 - 3x - 5) \div (-3x + 3)$ .
9. Find  $(x^3 + 5x^2 - 16x - 80) \div (x + 4)$  by using synthetic division or long division.
10. Expand and simplify  $(2x - 3y)(x + 5y) - (x - y)^2$ .
11. Simplify  $\frac{x^2 - 9}{x^3 + 7x^2 + 12x}$ .
12. If  $\frac{2x - 5y}{x - 6y} = \frac{3}{4}$ , find the value of  $\frac{x}{y}$ .
13. Make  $y$  the subject of the formula  $\frac{1}{x} + \frac{1}{\sqrt{y}} = \frac{1}{z}$ .
14. Given that  $\frac{ax - 5y}{5a - 2x} = \frac{2}{3}$ , express  $a$  in terms of  $x$  and  $y$ .
15. Simplify  $\sqrt{2} + 1 + \frac{1}{1 + \sqrt{2}}$

## **II. SOLVE:**

1. Solve  $x^2 - 2x = 24$  by completing the square.

2. Find the exact solution  $x^2 - 5x = 36$  by using the Quadratic Formula.

3. Solve the system of equations by using substitution.

$$6r + 7s = -1$$

$$2r + 4s = -12$$

4. Solve the system of equations by using elimination.

$$-3p - 9q = -63$$

$$-8p - 6q = -60$$

5. Solve for  $x$ :  $\sqrt{9x - 3} + 1 = 20$ .

6. Solve for  $x$ :  $\sqrt{4x + 1} + 2 = \sqrt{8x + 7}$ .

7. Solve for  $x$ :  $5x^3 - 7x^2 - 19x - 15 = 0$ .

8. Solve for  $x$ :  $\frac{4}{x-4} - \frac{7}{x+5} = \frac{66}{x^2 + x - 20}$ .

9. Solve for  $x$ :  $(2x + 3)(x + 8) \geq 0$ .

10. Solve for  $y$ :  $\frac{2y+1}{5} - \frac{2+7y}{15} > \frac{2}{3}$ .

11. Given that  $x = \frac{12+y}{4-y}$ , solve the following:

a) If  $y = -2$ , calculate the value of  $x$ , giving your answer as a fraction in its lowest terms.

b) Express  $y$  in terms of  $x$ .

12. Solve the following equations:

a)  $3x^2 + 3 = 10x$

b)  $(5x - 2)^2 - 9x^2 = 0$

13. The sides of an equilateral triangle are  $(2y + 3)$  cm,  $(x + 2)$  cm, and  $(x + y - 1)$  cm. Find the perimeter of the triangle.

### **III. GRAPH:**

1. Use the graph of  $f$  to describe the transformation that results in the graph of  $g$ . Then sketch the graphs of  $g$  and  $f$ .

$$f(x) = x^2, g(x) = 3(x-2)^2 - 1$$

2. For the following, identify the parent function and then graph using transformations. State the domain, range, and asymptotes if applicable.

a)  $y = \frac{4}{3}x - 3$

b)  $y = -3(x-1)^2$

c)  $y = \frac{1}{x+2} - 3$

d)  $y = \sqrt{x+1} + 2$

e)  $y = -\frac{1}{2}x^3$

f)  $y = |-x| + 1$

g)  $y = 2^x$

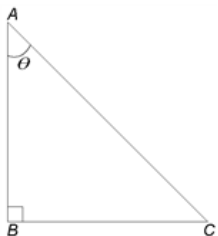
h)  $y = \log_2(x-2)$

**IV. EXPONENTIAL AND LOGARITHMIC FUNCTIONS:**

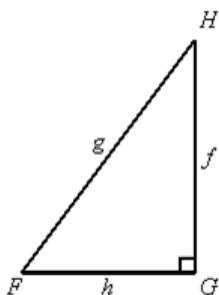
1. Evaluate the expression  $\log_5 \frac{1}{25}$ .
2. Evaluate the expression  $\log_3 243$ .
3. Evaluate the expression  $6^{\log_6 1.5}$ .
4. Evaluate the expression  $\log 100000$ .
5. Solve the equation for  $x$ :  $32^{x-1} = 16^{x+4}$ .
6. Solve the equation for  $x$ :  $\log_7(x^2 + 11) = \log_7 15$ .
7. Solve the equation for  $y$ :  $\ln(-y + 4) - \ln(y + 3) = \ln(-3y + 1)$ .
8. Solve  $\log_6 x = 2$ .
9. Expand the expression:  $\log_6 \frac{2x+6}{\sqrt[5]{3-3x}}$ .
10. Solve the equation for  $x$ :  $2.9^x = 9.7$ .

**V. GEOMETRY & TRIGONOMETRIC FUNCTIONS AND EQUATIONS:**

1. Find the values for sine, cosine, and tangent for angle  $\theta$ , when  $AC = 26$  and  $BC = 24$ .



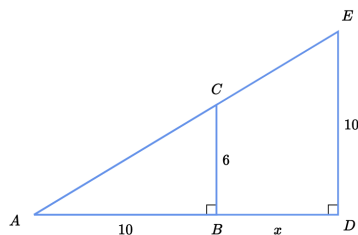
2. If  $g = 35.4$  and  $f = 28.7$ , find the measure of angle F. Round to the nearest tenth.



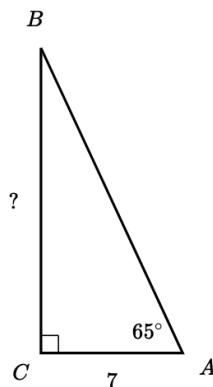
3. Find the area of a sector with a central angle of  $170^\circ$  and a radius of 17 millimeters. Round to the nearest tenth.

4. For a circle of radius 3 feet, find the arc length  $s$  subtended (intercepted) by a central angle of  $21^\circ$ .

5. Find  $x$ .



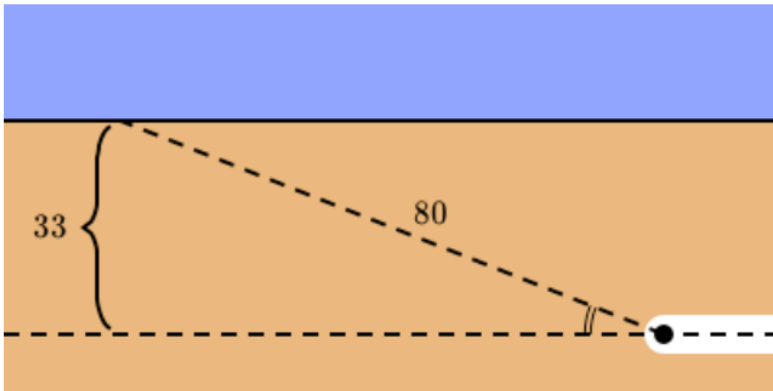
6. Find BC.



7.

Bugs Bunny was 33 meters below ground, digging his way toward Pismo Beach, when he realized he wanted to be above ground. He turned and dug through the dirt diagonally for 80 meters until he was above ground.

**What is the angle of elevation, in degrees, of Bugs Bunny's climb?**  
*Round your final answer to the nearest tenth.*

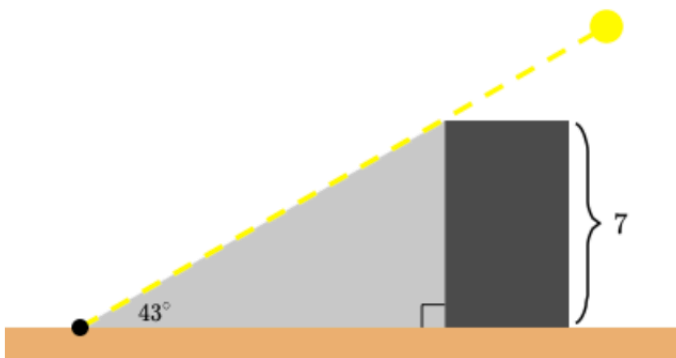
°

8.

Archimedes went to sleep beside a big rock. He wanted to get up at 8 AM, but the alarm clock was yet to be invented! He decided to sleep at the spot where the rock's shadow should end when it's 8 AM so as to be awakened by the direct sunlight.

Archimedes knew that at 8 AM, the sunlight reaches the ground at an angle of  $43^\circ$ . The rock beside which he slept was 7 meters tall.

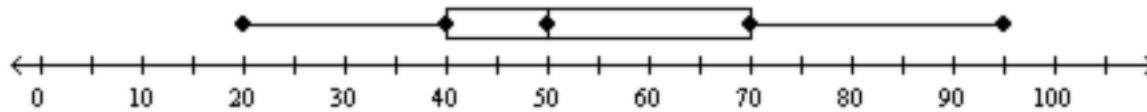
**How far from the rock did Archimedes go to sleep?**  
*Round your final answer to the nearest hundredth.*

 meters



## **VII. STATISTICS:**

1. Jeffrey surveyed 50 randomly selected workers at a factory. He collected data about the individual output of a worker on an average day. The results are shown using the box-and-whisker plot.



- What percent of workers have output more than 70 units?
  - What is the interquartile range of the box-and-whisker plot shown?
  - Find the range of the data shown in the box-and-whisker plot.
2. The IB scores attained by a group of students are listed as follows: 6 4 5 3 7 3 5 4 2 5
- Find the median grade.
  - Calculate the interquartile range.
  - Find the probability that a student chosen at random from the group scored at least an IB score of 4.

3.

The following frequency table records the number of text messages sent in a day by 50 fifteen-year-olds.

<i>No. of messages</i>	<i>Frequency</i>
0	2
1	4
2	7
3	4
4	2
5	0
6	1
7	8
8	13
9	7
10	2

- For this data, find the:
  - mean
  - median
  - mode.
- Construct a column graph for the data and show the position of the measures of centre (mean, median and mode) on the horizontal axis.
- Describe the distribution of the data.
- Why is the mean smaller than the median for this data?
- Which measure of centre would be the most suitable for this data set?

4. Find  $a$ , given that 10,  $a$ , 15, 20,  $a$ ,  $a$ , 17, 7 and 15 have a mean of 12.

5. Daniel grows apples and chooses at random a sample of 100 apples from his harvest.

He measures the diameters of the apples to the nearest cm. The following table shows the distribution of the diameters.

<b>Diameter (to the nearest cm)</b>	5	6	7	8	9
<b>Frequency</b>	15	27	33	17	8

Using your graphic display calculator, write down the value of

- a) the mean of the diameters in this sample;
- b) the standard deviation of the diameters in this sample.

6. The amount of time that a sample of students at a college spends studying physics each week is shown below. Construct a boxplot.

Time Spent Studying Physics (hours)					
12	30	27	23	13	19
27	33	39	20	31	26

7.

The selling price of nine houses are:

\$158 000,	\$290 000,	\$290 000,	\$1.1 million,	\$900 000,
\$395 000,	\$925 000,	\$420 000,	\$760 000	

- a** Find the mean, median and modal selling prices.
- b** Explain why the mode is an unsatisfactory measure of the middle in this case.
- c** Is the median a satisfactory measure of the middle of this data set?